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Sir:

Attached please find a translation of U.S. Provisional Patent Application No. 60/438,674 filed January 8, 2003 in the German language. Applicants hereby state that the translation is accurate.

Respectfully submitted,

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PRINTING FORM AND METHOD FOR MODIFYING ITS WETTING PROPERTIES

[0001] The present invention is directed to a printing form having a surface which has silicon and a pattern composed of hydrophilic and hydrophobic regions, the hydrophilic regions having a first chemical state and the hydrophobic regions having a second chemical state that differs from the first state. The present invention is also directed to a method for modifying the wetting properties of a printing form having a surface which has silicon, the surface being brought into a first chemical state having a first wetting property, and a portion of all regions of the surface being brought into a second chemical state having a second wetting property by modifying the chemical terminal groups of the surface.

[0002] From U.S. Patent 3,678,852, a printing form is known which is coated with an amorphous semiconductor. It discusses using a laser beam to change the disordered amorphous state of the semiconductor into a more highly ordered crystalline state. In the crystalline state, the semiconducting surface is rougher so that the reordering of the semiconducting surface results in liquids adhering better in the region of the rougher surface than in the amorphous smooth regions. A printing form produced in accordance with this method is limited by the minimum size of the crystalline regions.

[0003] From the document WO 00/21753, it is known that a printing form which has a surface having silicon can be brought into a first chemical state having a first wetting property and into a second chemical state having a second wetting property. The local wetting property, thus the local hydrophilic or hydrophobic wetting property of the printing form, can be controlled by altering the chemical terminal groups of the surface having correspondingly different electronic properties. For this purpose, a surface having a first chemical structure is produced, which preferably has an essentially uniform hydrophilic or hydrophobic wetting property. This surface is then converted in localized areas by a localized modification of the chemical structure (terminal groups) into the respective other state of the wetting property, thus from hydrophilic to hydrophobic or from hydrophobic to hydrophilic.

[0004] In a preferred specific embodiment, silicon is selected as a semiconductor in the document WO 00/21753. The surface is first brought into a hydrophobic state, SiH, SiH₂ and/or SiH₃ groups being present at the surface, for example. To modify the hydrophobic behavior, the hydrophobic terminal group is then exchanged locally for a hydrophilic terminal group or converted into such a group, so that, for example, SiOH, SiOSi and/or SiO terminal groups replace the hydrophobic terminal groups.

[0005] The object of the present invention is to propose an alternative printing form having regions of a strongly hydrophobic state, and to provide a method for locally and repeatedly modifying their wetting properties.

[0006] This objective is achieved in accordance with the present invention by a printing form having the features as set forth in claim 1 and by a method having the features as set forth in claim 10. Advantageous further embodiments of the present invention are delineated in the dependent claims.

[0007] A printing form according to the present invention has a surface which has silicon and a pattern composed of hydrophilic and hydrophobic regions, the hydrophilic regions having a first chemical state and the hydrophobic regions having a second chemical state that differs from the first chemical state. The printing form according to the present invention is distinguished in that, in at least one of the hydrophobic regions, preferably in all hydrophobic regions, the surface has silicon atoms, to each of which at least one organic terminal group is attached, preferably, in each instance, a number of a specific organic terminal group. The sum of the atomic weight of the atoms, which are not silicon atoms, attached to the silicon atoms in the terminal groups is greater than 33.5 u. The atomic weight is indicated in relative atomic weight units u. A methyl terminal group has approximately 15 u atomic weight units, a methanol terminal group approximately 31 u, a fluorine atom approximately 19 u.

[0008] In hydrophobic regions, the printing form according to the present invention advantageously has highly hydrophobic terminal groups. The extent to which the wetting properties of the hydrophilic and hydrophobic regions differ may vary greatly depending on the selection of an organic terminal group, in particular, the difference may represent a substantial contrast or be quite pronounced.

[0009] The surface of the printing form may be made up of pure silicon, amorphous or polycrystalline or crystalline. Besides pure silicon, however, silicon nitride ceramics or their layered systems may also be used. The silicon nitride ceramics may be stoichiometrically composed of Si_3N_4 or non-stoichiometrically of silicon nitride (Si_xN_y). The silicon nitride ceramics may be amorphous. In addition, the surface of the printing form may be composed of a stoichiometric or non-stoichiometric silicon oxide ceramic (glass ceramic) or of a mixed phase of silicon, oxygen and nitrogen, of a silicon oxynitride ceramic ($\text{Si}_x\text{O}_y\text{N}_z$). On surfaces of this kind, it is advantageously possible to implement and/or control a great variety in the selection and possible arrangements of organic terminal groups. Silicon nitride ceramics, in particular, may have a greater mechanical strength than pure silicon.

[0010] One advantageous specific embodiment provides for the surface of the printing form according to the present invention to be accommodated as a thin amorphous film on a metallic carrier which has titanium (preferably), aluminum, chromium or gold, for example. In particular, the carrier may be a sheet metal, such as titanium sheet metal. The carrier may be plate-shaped, cylindrical or sleeve-shaped. The amorphous film is less than 500 micrometers thick, preferably the film thickness is 0.5 to 10 micrometers. Alternatively, the printing form may also be completely made of the amorphous material. A hydrophilic state of a surface which has silicon may be realized by oxide terminal groups and/or hydroxide terminal groups, such as silanol groups (SiOH). Typically, such a surface has a plurality of OH groups per square nanometer (nm^2). Surfaces containing silicon nitride ceramics have, in addition to silanol groups, also hydrophilic silyl amine terminal groups ($-\text{SiNH}_2$, $=\text{SiNH}$) occurring at the surface. This state of pronounced hydrophilicity may be achieved by wet-chemical reactions, as described, for example, in the document WO 00/21753, whose disclosure is incorporated herein by reference, or by thermal heating or photochemically, for example by ozonization in a normal atmosphere having oxygen and/or water molecules, or by photodissociation. For thermal heating, a laser light source which emits in the infrared or visible spectral region may preferably be used. A photochemical conversion may be effected by UV irradiation or VUV irradiation (vacuum ultraviolet irradiation at a wavelength larger than 100 nm and smaller than 200 nm).

[0011] A hydrophobic state of a surface having silicon may be effected by hydrogen termination with the aid of hydrosilanes, for example SiH , SiH_2 and/or SiH_3 groups. In

accordance with the present invention, the surface containing silicon may be brought into a strongly hydrophobic state in that a termination is carried out with the aid of methyl terminal groups, in particular $-\text{Si}(\text{CH}_3)_3$ or $\equiv \text{Si}-\text{C}(\text{CH}_3)_3$, or a termination by unsubstituted and/or partially or completely halogenated, in particular chlorinated or fluorinated alkyl terminal groups, for example CF_3 groups. In hydrophobic regions, silicon atoms at the surface may carry a plurality of organic terminal groups. In other words, a silicon atom at the surface may be polysubstituted. The organic terminal groups in hydrophobic regions may have, in particular, less than 21 carbon atoms. In other words, the number of carbon atoms may be a natural number from the interval of 1 through 20 (with interval boundary). In particular, 1 through 6 carbon atoms may preferably be present in a chain of the organic terminal group.

[0012] In hydrophobic regions of the printing form according to the present invention, organic terminal groups, in particular ring- or chain-shaped terminal groups, may be attached by an Si-C bond and/or Si-O-C bond and/or an Si-O-Si-C bond.

[0013] Also provided in the context of the inventive idea is a method according to the present invention for modifying the wetting properties of a printing form having a surface which has silicon, the surface (preferably all regions of the surface which form a printing surface) being brought into a first chemical state having a first wetting property, and a portion, in particular a portion of all regions of the surface being brought into a second chemical state having a second wetting property by modifying the chemical terminal group of the surface. The method according to the present invention is distinguished in that organic terminal groups are attached to silicon atoms at the surface in such a way that the sum of the atomic weight of the atoms, which are not silicon atoms, attached to the silicon atoms at the surface is greater than 33.5 u. In particular, the first wetting property may be hydrophilic and the second wetting property hydrophobic, or the first wetting property hydrophobic and the second wetting property hydrophilic.

[0014] The method according to the present invention may be carried out quite beneficially using a printing form whose surface is amorphous, polycrystalline or crystalline silicon, or a stoichiometric or non-stoichiometric silicon ceramic containing oxygen and/or nitrogen. The method according to the present invention enables unsubstituted and/or halogenated, for example partially and/or completely chlorinated and/or partially fluorinated and/or completely

fluorinated terminal groups, in particular aryl terminal groups or alkyl terminal groups to be bonded as organic terminal groups in hydrophobic regions of the printing form. In particular, the organic terminal groups in the hydrophobic regions may be CH_3 terminal groups and/or CF_3 terminal groups. The chain molecules may include CH_3 terminal groups and/or CF_3 terminal groups, in particular.

[0015] The purpose of the method according to the present invention for modifying the wetting properties of a printing form is to produce a structure of hydrophilic and hydrophobic regions on the printing form in a way that will allow the structure to be duplicated in an offset printing process. In accordance with the present invention, the method for modifying the wetting properties provides for bringing about the second chemical state by localized processing using a controlled light source in such a way that the second chemical state corresponds to an image information to be printed or to its negative (an image information that is not to be printed).

[0016] A direct bonding of alkyl groups or fluoralkyl groups to the surface of the printing form via Si-C bonds may be accomplished by photoinitiation of halogenosilanes, such as $\text{Cl-Si}(\text{CH}_3)_3$, alcohols, alkenes and/or alkynes. In solution, a bonding to reactive halogen-containing molecules such as iodoform is possible.

[0017] Alkoxyl monolayers, in other words alkyl groups, which are fixed via Si-O-C bonds to the surface, may be obtained via reactions of alcohols (R-OH), preferably having four or five carbon atoms in a chain, since these substances are not very dangerous to people or the environment, or of aldehydes (R-CHO), with a hydrogen-terminated, halogen-terminated, or oxide-terminated surface, which has silicon. In this case, R is an unsubstituted alkyl group or aryl group or a partially or completely fluorinated alkyl group or aryl group. The hydrocarbon group may be chain-shaped or ring-shaped, in particular aromatic, for example a phenyl ring (C_6H_5-) or a substituted phenyl ring. The reaction may be accelerated by the action of light, preferably in the UV spectral region, for photochemical activation. The chain-shaped or ring-shaped aromatic unsubstituted or fluorinated carbon terminal groups may have a different number of carbon atoms, preferably 1 through 6 carbon atoms.

[0018] Alternatively, alkyl groups may be bonded via Si-O-Si-C bonds using siloxane chemistry to alkylchlorosilanes, alkylalkoxysilanes, and/or alkylaminosilanes at an oxide-

covered surface containing silicon. The unsubstituted or fluorinated alkyl group may have a chain of a plurality of carbon atoms, preferably 1 through 6 carbon atoms, to which a CH₃ or a CF₃ terminal group or a plurality of CH₃ or CF₃ terminal groups are attached. In other words, in at least one of the hydrophobic regions, the organic terminal groups each have a chain of a plurality of carbon atoms, to which CH₃ or CF₃ groups are attached. The hydrophobic behavior is influenced only little by the length of the carbon chain. When working with long chains (up to 20 carbon atoms), given a high enough surface density of the organic terminal groups and a suitable chain structure, an additional stabilization may advantageously result from lateral van der Waals interactions; a self-assembled monolayer (SAM) may form. For the printing process, however, a short carbon chain and an arrangement having a relatively low surface density of the organic terminal groups, already suffice. A typical concentration is between 10^{14} and 10^{11} terminal groups per cm², in particular between $5 \cdot 10^{12}$ and $5 \cdot 10^{11}$ terminal groups per cm². A high enough concentration must be achieved in order to attain a strong enough hydrophobicity. At the same time, the concentration should be as low as possible or necessary, since a subsequent removal of the organic terminal groups is advantageously facilitated when working with small terminal group molecules and/or a low surface density.

[0019] A higher reaction rate may be achieved when bonding methyl-containing and/or methylene-containing and/or fluorine-containing hydrophobic organic terminal groups at the surface of a printing form in a reaction with substantially more reactive, in particular radical starting molecules. For example, an organic terminal group may be bonded by reaction with iodoform and/or with trimethylenemethane derivatives, which may occur in a triplet and/or in a dipolar singlet state. For the practical handling of such reactive substances, it is advantageous to use a stable precursor molecule. This is advantageously 1,1-dialkoxy-2-methylenecyclopropane (DMCP). From methylenecyclopropane derivatives, dipolar trimethylene derivatives may be produced by thermal or irradiation processes. Further advantages, advantageous specific embodiments and further refinements of the present invention are described on the basis of the following examples.

[0020] The first example relates to a bonding of a hydrophobic layer to alkyl terminal groups or fluoroalkyl terminal groups through Si-C bonds.

[0021] Reactive hydrocarbons, such as alkenes and/or alkynes, may be deposited through photoactivation directly on silicon while forming Si-C bonds (\equiv Si-R). In other words, R terminal groups are formed at or bonded to silicon surface atoms, R signifying an aryl group or an alkyl group. The starting point for such a bonding is a hydrogen-terminated silicon surface. The document WO 00/21753 describes a method for obtaining a hydrogen-terminated silicon surface of this kind. This document is incorporated by reference in the disclosure of this specification. The problem of the relatively slow course of the reaction, during which, under normal conditions, a partial oxidation of the silicon surface may set in at the same time, may be countered by using pure chemicals and reactive precursor molecules, such as radicals. When reactive precursor molecules of this kind are used, the alkylation process is considerably accelerated.

[0022] Starting out from a substantially uniform, stable termination of the surface using aryl groups or alkyl groups or fluorinated aryl groups or alkyl groups, for purposes of imaging using laser irradiation, the surface may be oxidized and thus hydrophilized in a spatially selective manner, thus in partial regions. Finally, the image may be erased in that the entire surface is oxidized and/or again hydrogen-terminated, returning it to its original state.

[0023] In a first specific embodiment of an imaging method using hydrophilic domains, i.e., for changing the wetting property from hydrophobic to hydrophilic, using a laser in the infrared, visible or ultraviolet spectral region in the atmosphere, aryl terminal groups and alkyl terminal groups, respectively, in particular methyl terminal groups and fluormethyl terminal groups, respectively, are oxidized and removed, not always completely, but only partially, depending on the radiant power and wavelength, with increasing number of the carbon atoms in the organic terminal group. The remaining methylene, methyl or fluormethyl terminal groups are oxidized, however, to aldehyde or carboxyl groups and, thus, likewise become hydrophilic.

[0024] If very simple terminal-group molecules and/or a UV laser or a VUV laser (vacuum UV, thus, in particular, having a wavelength shorter than 200 nm) are used, then an alternative second, effective, specific embodiment of the imaging method provides for the entire terminal group to be removed up to the silicon or the Si-O-Si bonds, during the imaging step employing hydrophilic domains or partial regions, in that all C-C and C-H bonds are dissociated and oxidized by photodegradation. Due to the co-action of oxygen, mainly H₂O and CO₂ and potentially CO,

as well, are produced as volatile reaction products of the induced radical reactions. On the silicon surface liberated in such a way, hydrophilic groups, such as silanol groups, are formed. When a surface of a silicon nitride ceramic is used, silyl amine groups may also additionally form. Thus, to facilitate removal, it is practical to select the alkyl groups to be as short-chain as possible. Preferred are chain lengths of 1 to 5 carbon atoms. For a new imaging operation, the alkyl groups are completely removed. A removal process may be carried out photochemically using UV or VUV light sources, in particular lasers, or photothermally using infrared or visible light sources, in particular lasers.

[0025] A second example relates to the bonding of a hydrophobic layer to aryl or alkyl terminal groups and fluoroalkyl terminal groups, respectively, through Si-O-C bonds.

[0026] As the result of reactions of primary alcohols (R-OH) and/or secondary alcohols (R-(OH)₂) and/or aldehydes (R-CHO) with a hydrogen-terminated, halogen-terminated, or oxide-terminated silicon surface, the aryl residue or alkyl residue and fluoroalkyl residue, respectively, are bonded to the surface via an oxygen bridge to the carbon (Si-O-R). Thus, a hydrophobic surface having aryl or alkyl terminal groups and fluorinated alkyl terminal groups, respectively, is formed which, as already described in the first example, may be imaged with hydrophilic regions.

[0027] Secondary alcohols having three or four carbon atoms are preferred. Under certain conditions, the secondary alcohols may form O-bridge-type bonds between two organic terminal groups, imparting additional stability to the modified surface. In accordance with the processes described in the first example, the original termination may be regenerated.

[0028] The third example relates to a bonding of a hydrophobic layer to aryl or alkyl terminal groups and fluoroalkyl terminal groups, respectively, through Si-O-Si-C bonds.

[0029] The starting point is an oxidized hydrophilic silicon, silicon oxide, or silicon nitride surface, which is covered with silanol groups and/or silyl amine groups, for example. On this surface, molecules having hydrophobic alkyl terminal groups or fluorinated alkyl terminal groups are chemisorbed (Si-O-Si-R). This hydrophobic surface may be produced using alkyltrimethoxysilanes, for example CH₃-(CH₂)₂-Si-(OCH₃)₃, or fluoroalkylmethoxysilanes, for

example $\text{CF}_3\text{-(CH}_2\text{)}_2\text{-Si-(OCH}_3\text{)}_3$. In the process, the silicon atoms of the Si-O-Si anchoring group may additionally be cross-linked among themselves via oxygen bridges. Alternatively, halogen atoms or $\text{NR}_2\text{-OH}$ or OR groups of mono-, di- or trifunctional alkyldimethylsilanes react, forming alkyldimethylsilyl groups $\text{(Si-O-Si-(CH}_3\text{)}_2\text{-R}$, in particular $\text{Si-O-Si-(CH}_3\text{)}_3$), for example. In this context, it is not necessary for the surface density of the anchoring or of the terminating organic terminal group molecules to correspond to the density of the silicon surface atoms, rather it may be lower. A higher reaction rate for hydrophobing of the surface may be achieved using unsaturated compounds, such as trimethylenemethane derivatives. An imaging of the hydrophobic printing form in hydrophilic partial regions or domains may be accomplished by lasers, as already described with respect to the first example. The original hydrophilic state is regenerated by a light-induced, in particular laser-induced oxidation of the entire surface.

[0030] Further advantages, advantageous specific embodiments and further refinements of the present invention are described with reference to the following figure, as well as its description, in which:

[0031] Figure 1 is a schematic representation of the method according to the present invention.

[0032] In Figure 1, the method according to the present invention is schematically shown. A printing form 10 has a plate-shaped design and may be accommodated on a printing-form cylinder, in particular in a printing press. Printing form 10 has a surface 12 which has silicon. In its original state, especially following its manufacturing process, this printing form 10 is typically covered with a native oxide layer having a thickness of a few nanometers.

[0033] In a first method step according to the present invention, printing form 10 is provided with a defined substantially hydrophobic surface. For this purpose, surface 12 of printing form 10 is terminated using organic terminal groups or fluorinated organic terminal groups. The free valences of the silicon surface atoms are saturated by the corresponding terminal groups, in particular aryl terminal groups, alkyl terminal groups or fluoralkyl terminal groups.

[0034] At this point, hydrophobic region 14 of printing form 10 is hydrophilized in partial regions, in a further process step. This may be accomplished, for example, by one of the chemical reactions indicated above, in particular in accordance with Examples 1 through 3. Two methods have proven to be especially suitable for locally modifying hydrophobic surface 14. As shown exemplarily in Figure 1, local energy may be supplied via a laser 16 in order to trigger the chemical conversion process. Particularly suited for this are pulsed lasers which have a small beam cross section, enabling the chemical conversion to be carried out in a spatially limited area. This area may be smaller than the beam cross section. For example, a fluorine laser produces VUV light having a wavelength of approximately 157 nm. Alternatively, light having a short wavelength in this spectral region may be produced in non-linear optical processes from light having a longer wavelength. Using this laser or some other short-wave radiation source, a photochemical surface modification may be achieved. To achieve a photothermal modification, as already mentioned above, a multiplicity of light wavelengths is possible. For example, gas lasers (excimer lasers) or solid-state lasers (for example, frequency-multiplied Nd lasers) or diode lasers may be used.

[0035] Laser 16 is driven by a control unit 18. Means are provided for producing a relative movement between laser 16 and printing form 10 in such a way that light beam 20 emitted by laser 16 is able to sweep over or reach all points on the surface of printing form 10 which constitute the printing surface. For example, printing form 10 may be mounted or accommodated on a printing-form cylinder in a printing press, so that, as a result of the rotation of the cylinder about its axis of symmetry and a translation of laser 16 substantially in parallel to the axis of symmetry of the cylinder, light beam 20 is able to sweep over the entire surface of printing form 10. Light beam 20, respectively laser 16, while being guided over the printing form, is switched on and off or is focused and masked out, so that a pattern 22 to be printed or the negative of the pattern may be introduced as a hydrophilic image in the hydrophobic surface. Normally, this change in the molecular property on the surface of printing form 10 is not discernible with the naked eye, since it is a microscopic modification of the surface. The applied pattern 22 to be printed corresponds to a master image 21, which may be produced in different ways. For example, a master image 21 may be produced using a digitization method or directly, for example with the aid of a graphics program or a digital camera. Typically, master images 21 are processed and stored in a so-called RIP (raster imaging processor). The memory may be situated inside control unit 18 or externally therefrom. On the basis of the data ascertained and

stored in the RIP, light beam 20 is then controlled in such a way that pattern 22 to be printed is applied to printing form 10.

[0036] To erase a hydrophilic image produced in this manner in a hydrophilic surface 14, in another process step in a first specific embodiment, energy may be locally supplied by laser 16 to all other points of hydrophobic surface 14, so that the entire surface of printing form 14 is ultimately hydrophilized and thus modified, in particular rendered unstructured. In a second specific embodiment, energy may be supplied over a wide surface, for instance by a lamp, such as a UV lamp, in particular commercially available excimer lamps having various UV wavelengths.

[0037] With the aid of the described method, in various embodiments, a hydrophobic surface 14 of printing form 10 is able to be converted by local, photo-induced reaction processes in partial regions, into a modified, second chemical state, in particular hydrophilic state. The surface of printing form 10 may also be brought over a large area into either the first chemical state or the second chemical state, so that a pattern 22 to be printed is removed again, and a restructuring may be undertaken. Printing form 10 may also be described as a rewritable printing form or as a reusable printing form.

REFERENCE SYMBOL LIST

10	printing form
12	surface
14	hydrophobic region
16	laser
18	control unit
20	light beam
21	master
22	pattern to be printed

WHAT IS CLAIMED IS:

1. A printing form having a surface which has silicon and a pattern composed of hydrophilic and hydrophobic regions, the hydrophilic regions having a first chemical state and the hydrophobic regions having a second chemical state that differs from the first state, wherein, in at least one of the hydrophobic regions, the surface has silicon atoms, to which at least one organic terminal group is attached in each instance, the sum of the atomic weight of the atoms, which are not silicon atoms, attached to the silicon atoms in the terminal groups, being greater than 33.5 u.
2. The printing form having a surface which has silicon as recited in claim 1, wherein the surface is constituted of amorphous, polycrystalline or crystalline silicon, or a stoichiometric or non-stoichiometric silicon ceramic containing oxygen and/or nitrogen.
3. The printing form having a surface which has silicon as recited in claim 1 or 2, wherein the surface is provided as a thin amorphous film on a metallic carrier.
4. The printing form having a surface which has silicon as recited in one of the preceding claims, wherein, in at least one of the hydrophilic regions, the surface has silicon atoms, to which oxide and/or hydroxy terminal groups and/or silyl amine and/or aldehyde terminal groups and/or carboxyl terminal groups are attached.
5. The printing form having a surface which has silicon as recited in one of the preceding claims, wherein, in at least one of the hydrophobic regions, the organic terminal groups are unsubstituted and/or partially chlorinated and/or completely chlorinated and/or partially fluorinated and/or completely fluorinated terminal groups.
6. The printing form having a surface which has silicon as recited in claim 5, wherein, in at least one of the hydrophobic regions, the organic terminal groups each have a chain of a plurality of carbon atoms, to which CH₃ or CF₃ groups are attached.

7. The printing form having a surface which has silicon as recited in one of the preceding claims,
wherein, in at least one of the hydrophobic regions, the organic terminal groups have less than 21 carbon atoms.
8. The printing form having a surface which has silicon as recited in one of the preceding claims,
wherein, in at least one of the hydrophobic regions, the organic terminal groups are attached by an Si-C bond and/or an Si-O-C bond and/or an Si-O-Si-C bond.
9. The printing form having a surface which has silicon as recited in one of the preceding claims,
wherein, in at least one of the hydrophobic regions, silicon atoms at the surface carry a plurality of organic terminal groups.
10. A method for modifying the wetting properties of a printing form having a surface which has silicon, the surface being brought into a first chemical state having a first wetting property, and a portion of the surface being brought into a second chemical state having a second wetting property by modifying the chemical terminal groups of the surface,
wherein organic terminal groups are attached to silicon atoms at the hydrophobic surface in such a way that the sum of the atomic weight of the atoms, which are not silicon atoms, attached to the silicon atoms in the terminal groups, is greater than 33.5 u.
11. The method for modifying the wetting properties of a printing form as recited in claim 10,
wherein the first wetting property is hydrophilic and the second wetting property hydrophobic, or the first wetting property hydrophobic and the second wetting property hydrophilic.
12. The method for modifying the wetting properties of a printing form as recited in claim 10 or 11,

wherein the surface is constituted of amorphous, polycrystalline or crystalline silicon, or a stoichiometric or non-stoichiometric silicon ceramic containing oxygen and/or nitrogen.

13. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 12, wherein, in at least one of the hydrophobic regions, unsubstituted and/or partially chlorinated and/or completely chlorinated and/or partially fluorinated and/or completely fluorinated alkyl terminal groups are attached as organic terminal groups.

14. The method for modifying the wetting properties of a printing form as recited in claim 13, wherein, in at least one of the hydrophobic regions, chains of a plurality of carbon atoms, to which CH_3 or CF_3 groups are attached, are attached as organic terminal groups.

15. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 14, wherein the second chemical state is brought about by localized processing using a controlled light source in such a way that it corresponds to an image information to be printed or to its negative.

16. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 15, wherein the chemical state having hydrophilic wetting properties is achieved by thermal heating or photochemically.

17. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 16, wherein aryl groups and/or alkyl groups and/or fluoralkyl groups and/or chloroalkyl groups are attached via an Si-C bond through photoinitiation of halogenosilanes, alcohols, alkenes or alkynes.

18. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 16,

wherein organic terminal groups are attached through reaction with iodoform and/or trimethylenemethane derivatives and/or methylenecyclopropane derivatives and/or 1,1-dialkoxy-2-methylenecyclopropane (DMCP).

19. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 16,
wherein aryl groups and/or alkyl groups are attached via an Si-O-C bond as the result of reactions of primary alcohols and/or secondary alcohols and/or aldehydes.

20. The method for modifying the wetting properties of a printing form as recited in claim 19,
wherein the reaction is accelerated by the action of light.

21. The method for modifying the wetting properties of a printing form as recited in one of the preceding claims 10 through 16,
wherein alkyl groups are attached via an Si-O-Si-C bond through reaction with alkylalkoxysilanes, alkylaminosilanes and/or alkylchlorosilanes.

22. The method for modifying the wetting properties of a printing form as recited in claim 21,
wherein alkyl groups are attached via an Si-O-Si-C bond through reaction with alkyltrimethoxysilanes and/or fluoroalkylmethoxysilanes.

ABSTRACT

A printing form having a surface of pure silicon or of a silicon ceramic, which bears a pattern composed of hydrophilic and hydrophobic regions, the hydrophilic regions having a first chemical state and the hydrophobic regions having a second chemical state that differs from the first chemical state, in hydrophobic regions, the surface having silicon atoms, to which at least one organic terminal group is attached in each instance. The organic terminal group may be, in particular, an unsubstituted or halogenated aryl terminal group or alkyl terminal group and be attached via an Si-C, Si-O-C or Si-O-Si-C bond. Also a method for modifying the wetting properties of the printing form, the surface being brought into a first chemical state having a first wetting property, and a portion of all regions of the surface being brought into a second chemical state having a second wetting property by modifying the chemical terminal groups of the surface.

(Figure 1).